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PATTERSON & SHERIDAN, L.L.P.
3040 POST OAK BOULEVARD, SUITE 1500
HOUSTON, TX 77056

EXAMINER	
LIU, LI	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/662,969	Applicant(s) MACDOUGALL ET AL.	
	Examiner LI LIU	Art Unit 2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 May 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,6,8-12,14,16-22,26,29 and 30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,6,8-12,14,16-22,26,29 and 30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed Applicant's arguments filed 05/05/2008 have been fully considered but they are not persuasive. The examiner has thoroughly reviewed Applicant's amendment and arguments but firmly believes that the cited reference reasonably and properly meet the claimed limitation.

Applicant's argument – "a variable threshold peak detection unit (reference number 32) and a spectral analysis device (34) disclosed in *Davis* lack any noise reduction functions. Instead of the variable threshold taught in *Davis* being used to remove noise, the threshold only identifies a level above which any signal must reach to not be considered noise. The passages cited by the Examiner relate to this setting of criteria applied against the signal that remains unchanged such that there is no indication of any removal of background noise as the Examiner contends".

Examiner's response – "The passages cited by the Examiner" also mention "[i]n a first stage discussed in more detail below" and "[i]n a second stage discussed in more detail below", and the details are presented in column 5-8.

Davis discloses "background and unwanted signals can often make it very difficult for a system to determine the location of a valid FBG signal from the unwanted background signals" and "[t]he present invention provides a method and apparatus for detecting a valid FBG signal on a returned optical spectra". And Davis states "if the optical spectrum ever peaks above the threshold, a flag is set which indicates that a peak is detected" (column 5, line 23-25). This threshold stage will permit the detection of

peaks which are extremely small and are almost vanishing into the noise or structures on the spectral profile (column 6, line 16-18). So, Davis teaches that only those peaks above the variable threshold can be considered and treated. As shown in Figures 4A and 4B, the peak P1 is determined starting at A1 and end at A2 (column 8 line 10-17); and similarly P2 and P3 are identified. And the peaks P1, P2 and P3 are let to pass through the detection process, and the background noise is not considered (column 8 line 10-25). As to the signal process or detection process, the background noise (e.g., the noise with λ < A1=1545.04 nm) is not let through the detection process, therefore, Davis teaches or reasonably suggests the noise reduction functions.

Davis also teaches a "Second Stage: Grating Profile Detection". Davis discloses "[w]hile robust in finding peaks, the first stage may occasionally let noise peaks through the detection process. These typically take the form of a noise spike of one point located on a high reflection in the background data. To add an additional level of robustness, a second stage of detection can be implemented." "In operation, the second stage is configured to act as a grating profile detection, tied directly to the expected FWHM of the FBG reflected signals. … . This final check assures that a stray noise peak is not detected as a FBG signal" (column 8 line 24-40). That is, Davis removes the stray noise peak and does not let the stray noise peak through the detection process. Therefore, Davis teaches the noise reduction functions.

Also, as admitted by the applicant, *Wang, Lo,* and *Lochmann* teach to remove noise, therefore, the combination of *Davis, Wang, Lo,* and *Lochmann* also teaches the noise reduction functions.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 6, 8-11, 14, 18-21, 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davis (US 6,346,702) in view of Wang et al (Wang et al: "Analysis and Suppression of Continuous Periodic Interference for On-Line PD Monitoring of Power Transformers", High Voltage Engineering Symposium, 22-27 August 1999, 5.212.P5) and Lo et al (US 6,207,961) and Lochmann et al (US 4,475,038).

1). With regard to claims 1, 6, 29 and 30, Davis discloses an optical system (Figure 2B) comprising:

a source (BROADBAND SOURCE 12 in Figure 2B) for producing optical signals;

an optical waveguide (Form the coupler 14 to FBG 18 in Figure 2B) having a noise producing element (connectors, splicers or imperfections in the FBG itself, column 1 line 40-41) and an optical filter element (the FBG 16 or 18 in Figure 2B);

a receiver for (20 in Figure 2B) converting applied optical signals into electrical signals;

a coupler (14 in Figure 2B) for coupling said produced optical signals into said optical waveguide and for coupling reflections from said noise producing element and

from said optical filter element to said receiver (20 in Figure 2B) as applied optical signals (column 3 line 59-64); and

a noise reduction system (the combination of 32 and 34 in Figure 2B) for producing a frequency spectrum of the electrical signals (after the optical detection unit 20, the optical signal is converted into electrical signal, column 4 line 3-8; and as shown in the Figures 3A, 3B, 4A and 4B, the noise reduction system produces and processes frequency spectrum of the electrical signal; 34 in Figure 2B is a spectral analysis device) and removing noise produced by said noise producing element from said electrical signals (column 4 line 16-67, and a variable threshold is used to remove the background noise. And two passages in 'column 4 line 16-67' also mention "In a first stage discussed in more detail below" and "In a second stage discussed in more detail below", and the details are presented in column 5-8, and in the second stage, Davis teaches to remove a stray noise peak from the detection process).

In the system of Davis et al, since the optical connectors and splices etc are present in the sensor system, the periodic noise is inherently in the noise background; and the noise reduction system of Davis removes the background noise including the periodic noise.

But, Davis et al does not expressly state (A) wherein the noise reduction system performs a frequency analysis of the electrical signals to identify a periodic noise, from said noise producing element, which is removed from the electrical signals using frequency based gating of the frequency spectrum; (B) the frequency analysis is a Fourier analysis (claim 6); (C) wherein the frequency based gating comprises of

selecting a bandwidth where periodic noise has been identified and removing the bandwidth from the electrical signals (claim 29); and (D) wherein the noise reduction system identifies periodic noise by identifying a rapidly varying signal from the frequency analysis (claim 30).

Performing a frequency analysis, such as a Fourier analysis, to identify periodic noise or other kinds of noise component from the frequency analysis on an electrical signal and the frequency based gating are well known and widely used method in the art. Wang et al discloses a system and method that uses Fast Fourier Transform technique to analyze the periodic noise of an electrical signal, the noise reduction system performs a frequency analysis of the electrical signals to identify a periodic noise, from said noise producing element, which is removed from the electrical signals using frequency based gating of the frequency spectrum (Abstract, Figures 2 and 3, Methods of Interference Eliminated); and the frequency analysis is a Fourier analysis (ABSTRACT, FFT technique); wherein the frequency based gating comprises of selecting a bandwidth where periodic noise has been identified and removing the bandwidth from the electrical signals (Digital Filtering Technique, FFT Threshold Digital Filter and Multi-Band-Pass Digital Filter, a multi-band rejection digital filter is used to remove the noise components); and wherein the noise reduction system identifies periodic noise by identifying a rapidly varying signal from the frequency analysis (Figures 2 and 3, and Digital Filtering Technique).

Another prior art, Lochmann et al, also teaches a Fourier analysis to remove or filter high frequency noise from raw spectral data to obtain a “smooth data curve”.

Lochmann et al teaches a three steps procedure: first, the data is transformed by Fourier analysis into a sinusoidal representation; the second step of the filtering procedure is the application of a damping factor to the transformed data; the third step of the filtering procedure involves transforming the damped data back into numerical form by inverse Fourier analysis (Figure 7, column 8 line 48 to column9 line 36). Lochmann et al teaches that Fourier analysis of the raw data has the effect of isolating the high-frequency noise relative to the data signal; by damping the transformed data and inversely transforming it back into a numerical representation, the high-frequency noise is eliminated without substantially affecting the data signal.

Although Wang et al teaches suppression of the periodic interference for partial discharged monitoring of power transform and Lochmann et al teaches removing of high frequency noise so to enhance neutron induced gamma ray logging records, both references are reasonably pertinent to the particular problem with which the applicant was concerned; that is, remove noise frequency component from electrical signals: obtaining electrical signal, using frequency analysis or fast Fourier transform technique to identify the noise frequency component, and removing the noise component, so to improve the signal quality or signal to noise ratio.

Another prior art, Lo et al, also teaches a fiber-optic optical sensor and uses FFT to remove noise frequencies. Lo et al teaches that the SNR of the sensor was improved through the use of digital signal averaging and FFT filters; the noise frequencies were efficiently removed by selecting a pass band in the power spectrum before transformation back to the time domain using inverse FFT (column 4, line 34-43).

Both Lochmann et al and Lo et al teach that the FFT is particularly preferred because of the availability of the fast fourier and inverse fast fourier computer subroutines at low cost and high speed (column 9 line 45-53 of Lochmann, and column 4 line 41-48 of Lo et al). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the frequency analysis and noise gating as taught by Wang et al and Lochmann et al and Lo et al to the system of Davis et al so that the noise can be efficiently identified and removed or gated out of the electrical signals in frequency domain, and measurement accuracy can be enhanced.

2). With regard to claim 8, Davis et al and Wang et al and Lochmann et al and Lo et al disclose all of the subject matter as applied to claim 1 above. And Davis et al further discloses wherein the optical filter element includes a fiber Bragg grating (FBG 16 or 18 in Figure 1B).

3). With regard to claim 9, Davis et al and Wang et al and Lochmann et al and Lo et al disclose all of the subject matter as applied to claim 1 above. And Davis further discloses wherein the optical waveguide includes a discontinuity (connectors, splicers or imperfections in the FBG itself, column 1 line 40-41).

4). With regard to claim 10, Davis et al and Wang et al and Lochmann et al and Lo et al disclose all of the subject matter as applied to claim 1 above. And Davis further discloses wherein the discontinuity is a splice (splicers, column 1 line 40-41).

5). With regard to claims 11, 14 and 26, Davis discloses a sensor comprising:

a source for producing optical signals (BROADBAND SOURCE 12 in Figure 2B);

an optical waveguide (Form the coupler 14 to FBG 18 in Figure 2B) having a noise producing element (connectors, splicers or imperfections in the FBG itself, column 1 line 40-41) and an optical filter element (the FBG 16 or 18 in Figure 2B);

a receiver (20 in Figure 2B) for converting applied optical signals into amplified electrical signals;

a coupler (14 in Figure 2B) for coupling said produced optical signals into said optical waveguide and for coupling reflections from said optical waveguide as applied optical signals to said receiver (column 3 line 59-64); and

a signal processor (the combination of 32 and 34 in Figure 2B) for producing a frequency spectrum of the electrical signals (after the optical detection unit 20, the optical signal is converted into electrical signal, column 4 line 3-8; and as shown in the Figures 3A, 3B, 4A and 4B, the signal processor produces and processes frequency spectrum of the electrical signal; 34 in Figure 2B is a spectral analysis device) and removing noise produced by said noise producing element from said electrical signals (column 4 line 16-67, and a variable threshold is used to remove the background noise. And two passages in 'column 4 line 16-67' also mention "In a first stage discussed in more detail below" and "In a second stage discussed in more detail below", and the details are presented in column 5-8, and in the second stage, Davis teaches to remove a stray noise peak from the detection process).

In the system of Davis et al, since the optical connectors and splices etc are present in the sensor system, the periodic noise is inherently in the noise background;

and the noise reduction system of Davis removes the background noise including the periodic noise.

But, Davis et al does not expressly state (A) wherein the signal processor performs a frequency analysis of the electrical signals to identify and remove a periodic noise, from the noise producing element, which is removed from the electrical signals using frequency based gating of the frequency spectrum; (B) wherein the frequency analysis is a Fourier analysis (claim 14); and (C) wherein the signal processor identifies periodic noise by identifying a rapidly varying signal from the frequency analysis (claim 26).

Performing a frequency analysis, such as a Fourier analysis, to identify periodic noise or other kinds of noise component from the frequency analysis on an electrical signal and the frequency based gating are well known and widely used method in the art. Wang et al discloses a system and method that uses Fast Fourier Transform technique to analyze the periodic noise of an electrical signal, the noise reduction system performs a frequency analysis of the electrical signals to identify a periodic noise, from said noise producing element, which is removed from the electrical signals using frequency based gating of the frequency spectrum (Abstract, Figures 2 and 3, Methods of Interference Eliminated); and the frequency analysis is a Fourier analysis (ABSTRACT, FFT technique); wherein the frequency based gating comprises of selecting a bandwidth where periodic noise has been identified and removing the bandwidth from the electrical signals (Digital Filtering Technique, FFT Threshold Digital Filter and Multi-Band-Pass Digital Filter, a multi-band rejection digital filter is used to

remove the noise components); and wherein the noise reduction system identifies periodic noise by identifying a rapidly varying signal from the frequency analysis (Figures 2 and 3, and Digital Filtering Technique).

Another prior art, Lochmann et al, also teaches a Fourier analysis to remove or filter high frequency noise from raw spectral data to obtain a “smooth data curve”. Lochmann et al teaches a three steps procedure: first, the data is transformed by Fourier analysis into a sinusoidal representation; the second step of the filtering procedure is the application of a damping factor to the transformed data; the third step of the filtering procedure involves transforming the damped data back into numerical form by inverse Fourier analysis (Figure 7, column 8 line 48 to column9 line 36). Lochmann et al teaches that Fourier analysis of the raw data has the effect of isolating the high-frequency noise relative to the data signal; by damping the transformed data and inversely transforming it back into a numerical representation, the high-frequency noise is eliminated without substantially affecting the data signal.

Although Wang et al teaches suppression of the periodic interference for partial discharged monitoring of power transform and Lochmann et al teaches removing of high frequency noise so to enhance neutron induced gamma ray logging records, both references are reasonably pertinent to the particular problem with which the applicant was concerned; that is, remove noise frequency component from electrical signals: obtaining electrical signal, using frequency analysis or fast Fourier transform technique to identify the noise frequency component, and removing the noise component, so to improve the signal quality or signal to noise ratio.

Another prior art, Lo et al, also teaches a fiber-optic optical sensor and uses FFT to remove noise frequencies. Lo et al teaches that the SNR of the sensor was improved through the use of digital signal averaging and FFT filters; the noise frequencies were efficiently removed by selecting a pass band in the power spectrum before transformation back to the time domain using inverse FFT (column 4, line 34-43).

Both Lochmann et al and Lo et al teach that the FFT is particularly preferred because of the availability of the fast fourier and inverse fast fourier computer subroutines at low cost and high speed (column 9 line 45-53 of Lochmann, and column 4 line 41-48 of Lo et al). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the frequency analysis and noise gating as taught by Wang et al and Lochmann et al and Lo et al to the system of Davis et al so that the noise can be efficiently identified and removed or gated out of the electrical signals in frequency domain, and measurement accuracy can be enhanced.

6). With regard to claim 18, Davis et al and Wang et al and Lochmann et al and Lo et al disclose all of the subject matter as applied to claim 11 above. And Davis et al further discloses wherein the optical filter element includes a fiber Bragg grating (FBG 16 or 18 in Figure 1B).

7). With regard to claim 19, Davis et al and Wang et al and Lochmann et al and Lo et al disclose all of the subject matter as applied to claim 11 above. And Davis et al further discloses wherein the optical waveguide includes a discontinuity (connectors, splicers or imperfections in the FBG itself, column 1 line 40-41).

8). With regard to claim 20, Davis et al and Wang et al and Lochmann et al and Lo et al disclose all of the subject matter as applied to claim 1 above. And Davis et al further discloses wherein the discontinuity is a splice (splicers, column 1 line 40-41).

9). With regard to claim 21, Davis discloses a method of compensating for optical reflection comprising:

producing an optical signal (BROADBAND SOURCE 12 in Figure 2B);

coupling (14 in Figure 2B) the optical signal into an optical waveguide having a noise producing element (e.g., splicer and connectors) and an optical filter element (the FBG in Figure 2B);

converting (20 in Figure 2B) reflections along the optical waveguide into electrical signals; and

removing noise (the combination of 32 and 34 in Figure 2B) produced by the noise producing element from the electrical signals such that the electrical signals from the optical filter element are retained (column 4 line 16-67. And two passages in 'column 4 line 16-67' also mention "In a first stage discussed in more detail below" and "In a second stage discussed in more detail below", and the details are presented in column 5-8, and in the second stage, Davis teaches to remove a stray noise peak from the detection process).

Davis uses spectral analysis to analyze the noise (32 and 34 in Figure 2B, and Figure 3 and 4) and a variable threshold/grating profile detection is used to remove the background noise/stray noise peak; and removing noise includes performing a frequency analysis (34 in Figure 2B is the spectral analysis device). In the system of

Davis et al, since the optical connectors and splices etc are present in the sensor system, the periodic noise is inherently in the noise background; and the noise reduction system of Davis removes the background noise including the periodic noise.

But Davis does not expressly disclose wherein gating out the periodic noise produced by the noise producing element from the electrical signals includes producing a frequency spectrum of the electrical signals and using frequency based gating to remove a first signal varying rapidly relative to a second signal as determined by a frequency analysis of the frequency spectrum.

Performing a frequency analysis, such as a Fourier analysis, to identify periodic noise or other kinds of noise component from the frequency analysis on an electrical signal and the frequency based gating are well known and widely used method in the art. Wang et al discloses a method that uses Fast Fourier Transform technique to analyze the periodic noise of an electrical signal, the noise reduction system performs a frequency analysis of the electrical signals to identify a periodic noise (the first signal varying rapidly relative to a second signal that is the signal shown in Figure 3d), which is removed from the electrical signals using frequency based gating of the frequency spectrum (Abstract, Figures 2 and 3, Methods of Interference Eliminated); wherein the frequency based gating comprises of selecting a bandwidth where periodic noise has been identified and removing the bandwidth from the electrical signals (Digital Fitlersing Technique, FFT Threshold Digital Filter and Multi-Band-Pass Digital Fitler, a multi-band rejection digital filter is used to remove the noise components); and the method produces a frequency spectrum of the electrical signals (Figure 2) and uses frequency

based gating to remove a first signal varying rapidly relative to a second signal as determined by a frequency analysis of the frequency spectrum (Figures 2 and 3, and Digital Filtering Technique).

Another prior art, Lochmann et al, also teaches a Fourier analysis to remove or filter high frequency noise ("the first signal varying rapidly") from raw spectral data to obtain a "smooth data curve" (the "second signal" or the required data signal). Lochmann et al teaches a three steps procedure: first, the data is transformed by Fourier analysis into a sinusoidal representation; the second step of the filtering procedure is the application of a damping factor to the transformed data; the third step of the filtering procedure involves transforming the damped data back into numerical form by inverse Fourier analysis (Figure 7, column 8 line 48 to column9 line 36). Lochmann et al teaches that Fourier analysis of the raw data has the effect of isolating the high-frequency noise relative to the data signal; by damping the transformed data and inversely transforming it back into a numerical representation, the high-frequency noise is eliminated without substantially affecting the data signal.

Although Wang et al teaches suppression of the periodic interference for partial discharged monitoring of power transform and Lochmann et al teaches removing of high frequency noise so to enhance neutron induced gamma ray logging records, both references are reasonably pertinent to the particular problem with which the applicant was concerned; that is, remove noise frequency component from electrical signals: obtaining electrical signal, using frequency analysis or fast Fourier transform technique

to identify the noise frequency component, and removing the noise component, so to improve the signal quality or signal to noise ratio.

Another prior art, Lo et al, also teaches a fiber-optic optical sensor and uses FFT to remove noise frequencies. Lo et al teaches that the SNR of the sensor was improved through the use of digital signal averaging and FFT filters; the noise frequencies (the first signal varying rapidly relative to a second signal that is the fluorescence signal) were efficiently removed by selecting a pass band in the power spectrum before transformation back to the time domain using inverse FFT (column 4, line 34-43).

Both Lochmann et al and Lo et al teach that the FFT is particularly preferred because of the availability of the fast fourier and inverse fast fourier computer subroutines at low cost and high speed (column 9 line 45-53 of Lochmann, and column 4 line 41-48 of Lo et al), and the SNR of the signal is improved. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the frequency analysis and noise gating as taught by Wang et al and Lochmann et al and Lo et al to the system of Davis et al so that the noise can be efficiently identified and removed or gated out of the electrical signals in frequency domain, and measurement accuracy can be enhanced.

4. Claims 2, 12 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davis et al and Wang et al and Lochmann et al and Lo et al as applied to claims 1, 11 and 21 above, and in further view of Keown (US 4,143,350).

Davis et al and Wang et al and Lochmann et al and Lo et al as discloses all of the subject matter as applied to claims 1, 11 and 21 above. And Davis teaches that the

"variable threshold peak detection unit 32 determines the DC component of the background signal by performing two running averages along the spectral trace. … . The local threshold value includes an overall minimum level term which is comparable to the noise level of the variable threshold peak detection unit 32". But Davis does not explicitly state wherein the noise reduction system or signal processor averages broadband noise and then subtracts the averaged level from the electrical signals.

However, the method of averaging the broadband noise and then subtracting the averaged level from the electrical signals is a well known method and widely used in the signal processing. As disclosed by Lo et al, the SNR of the sensor is improved through the use of digital averaging (column 4, line 34-35, Figure 6). Lochmann et al also teaches to subtract the background "baseline" to get the "true" signal component.

Another prior art, Keown, teaches to average the broadband noise and then subtract the averaged level from the electrical signals (ABSTRACT and column 6, line 6-15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the method of averaging noise taught by Lo and Lochmann and Keown to the system of Davis et al and Wang et al so that the broadband noise can be effectively suppressed and system performance is enhanced.

5. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davis et al and Wang et al and Lochmann et al and Lo et al as applied to claim 11 above, and in further view of Kringlebotn (US 6,097,487).

Davis et al discloses all of the subject matter as applied to claim 11 above. And Davis et al discloses a broadband source. Davis also discloses that the broadband source includes a narrow source swept over a broad band (column 3, line 53-55). But Davis does not expressly disclose that the source includes a tunable laser (claim 16); and the source includes a broadband light source and a tunable filter (claim 17).

However, Kringlebotn et al, in the same field endeavor, discloses a tunable laser or a broadband light source and a tunable filter (1 and 2 in Figure 1, Figure 4 and 6, column 2 line 62-67). By using a tunable filter, a fixed F-P filter, and a reference wavelength FBG, Kringlebotn et al constructs either a spectrum analyzer with a high degree of wavelength accuracy, or a control system for a tunable laser or a multi-wavelength laser array to be able to control and set the wavelength of the tunable laser/wavelengths of the laser array with a high degree of repeatability and accuracy, typically <1 pm.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply a tunable laser or a broadband light source with a tunable filter taught by Kringlebotn et al to the system of Davis et al so that an accurate frequency/wavelength scale can be obtained and system performance can be enhanced.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Mathews (US 5,431,170) teaches a device using the FFT to remove the noise components in the signal from the infra red sensor.

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LI LIU whose telephone number is (571)270-1084. The examiner can normally be reached on Mon-Fri, 8:00 am - 5:30 pm, alternating Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Li Liu
July 26, 2008

/Kenneth N Vanderpuye/
Supervisory Patent
Examiner, Art Unit 2613